Networking in the Transformational Communications Architecture

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Outline

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- Concept Overview
- Network Core/Edge
- Network Access Functions
- Protocol Stack
- Routing and Traffic Engineering
- Quality of Service
- Information Assurance
- Summary

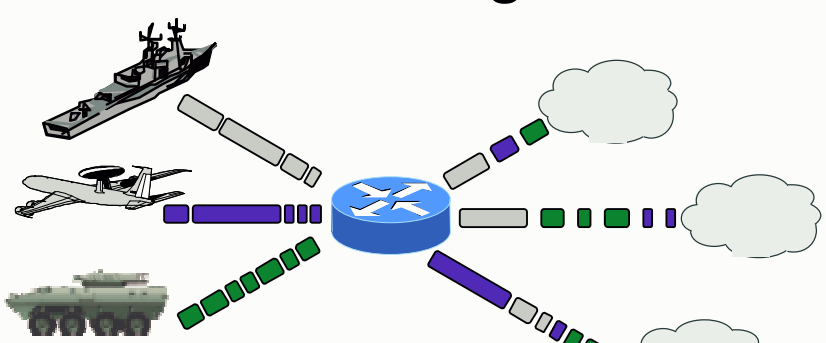
Introduction

- **Transformational Communications Architecture (TCA)**
  - Includes Department of Defense, Intelligence Community, and NASA
  - Provides a comprehensive framework for future acquisition programs

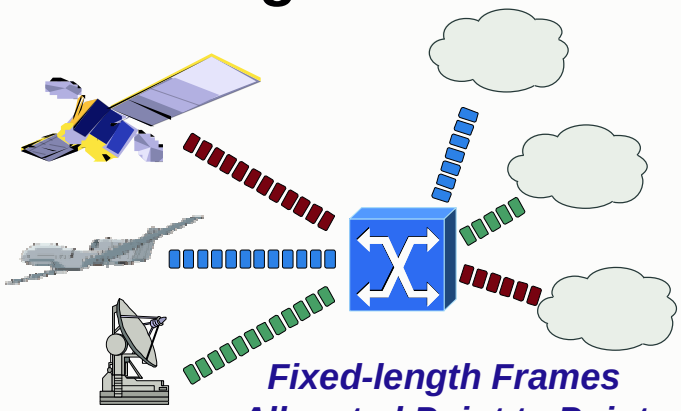
- **Motivation**
  - Increase system capabilities with new component technologies
  - Improve interoperability and facilitate information exchange
    - across multiple communications systems
    - among independent organizations in military and government
    - with international partners and coalition forces

Overview

- **Packet Routing and Circuit Switching**



Variable-length Datagrams
Any to Any Data Exchange



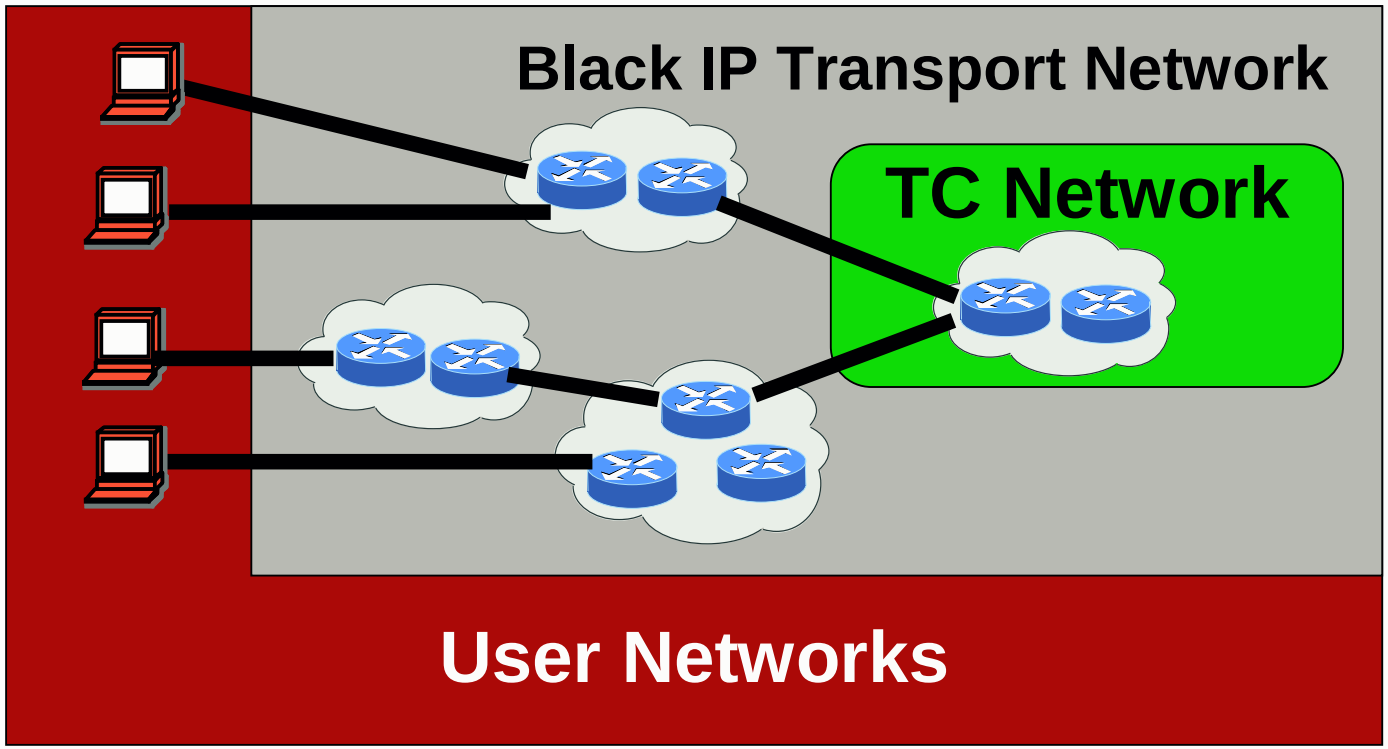
Fixed-length Frames
Allocated Point to Point

- **Multiple Services**
  - Data
  - Voice
  - Video
  - and more …

- **Part of a Network of Networks**

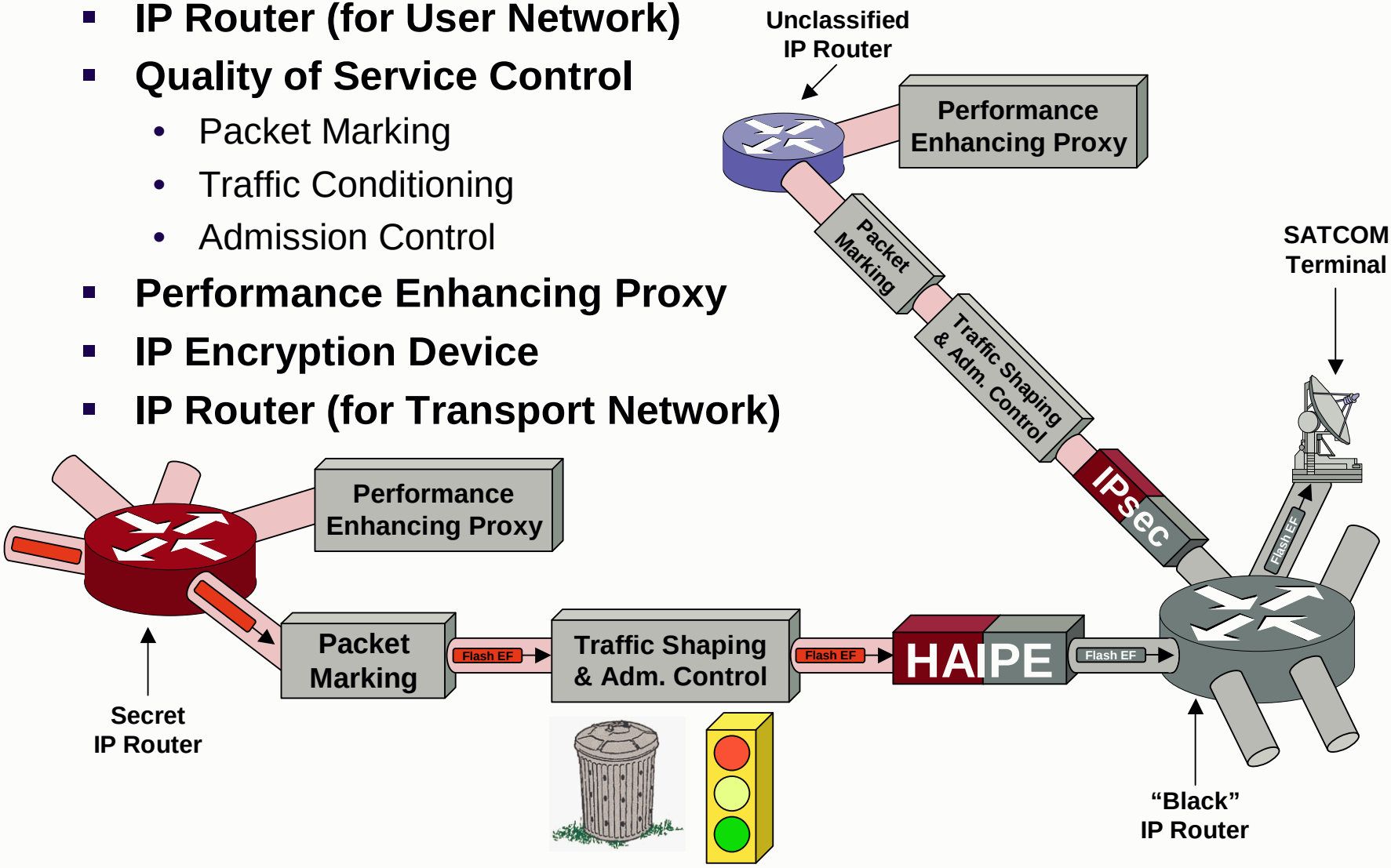
Network Core / Edge

- Infrastructure network provides common transport for data
- User devices and user networks connect at the “edge”
- Data is protected at edge before entering core network

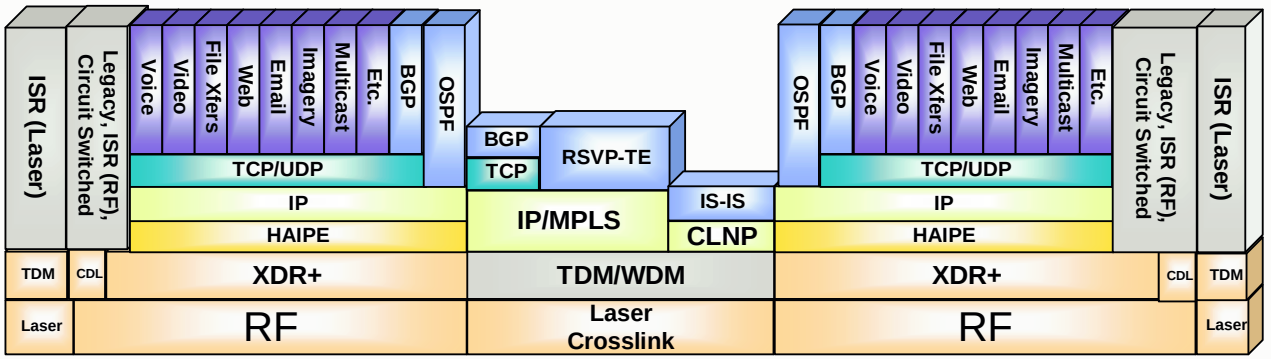


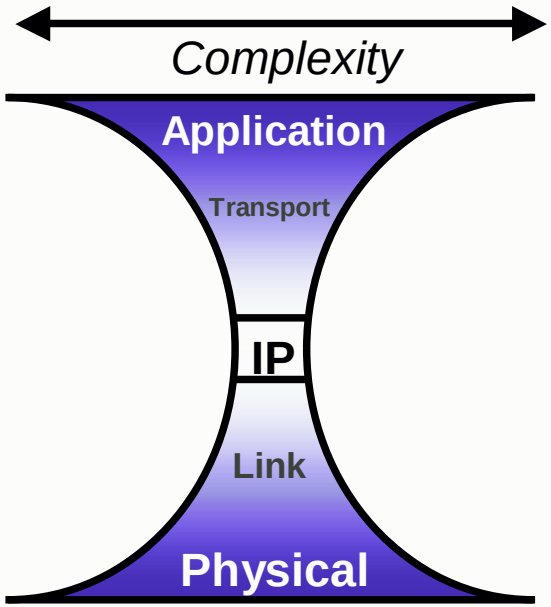
Network Access Functions

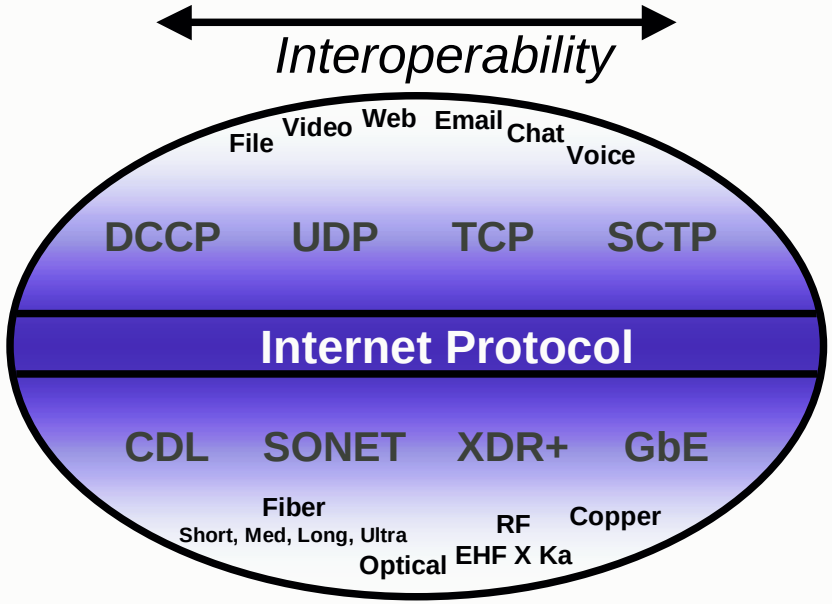
- **IP Router (for User Network)**
- **Quality of Service Control**
  - Packet Marking
  - Traffic Conditioning
  - Admission Control
- **Performance Enhancing Proxy**
- **IP Encryption Device**
- **IP Router (for Transport Network)**



Protocol Stack

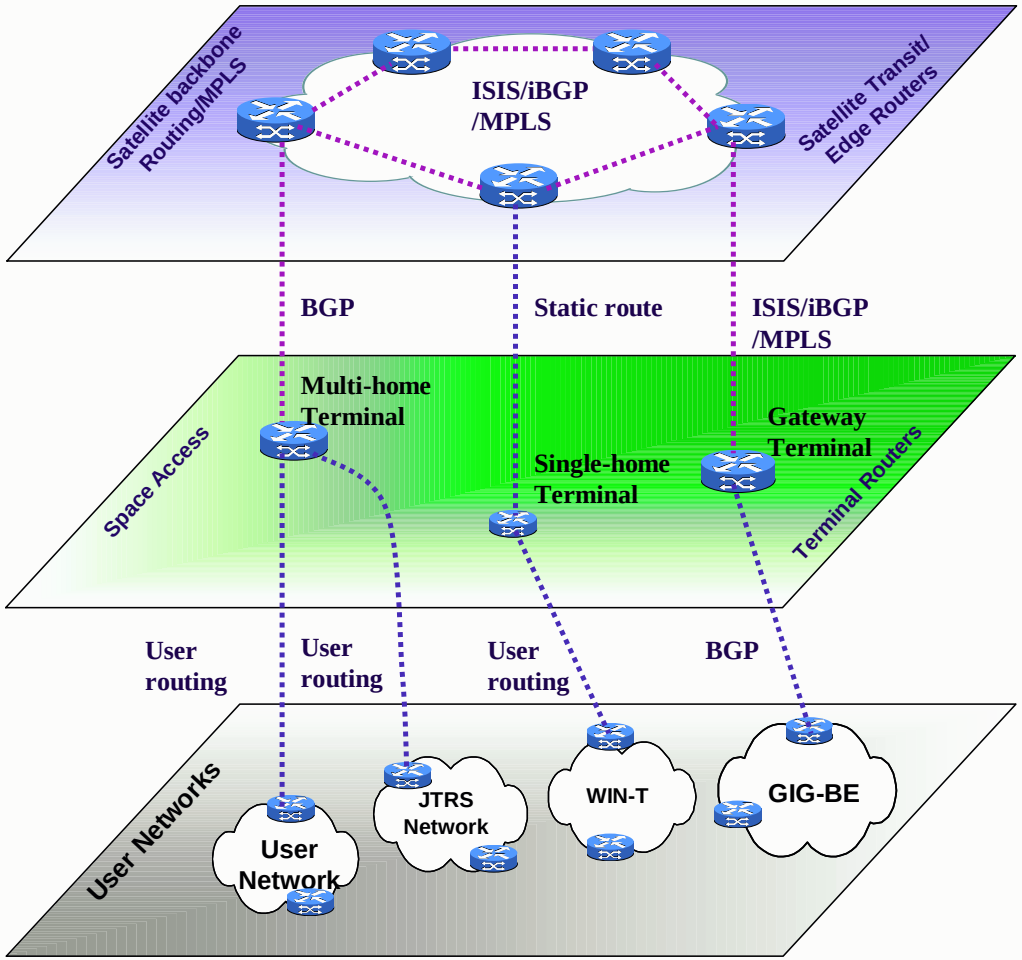




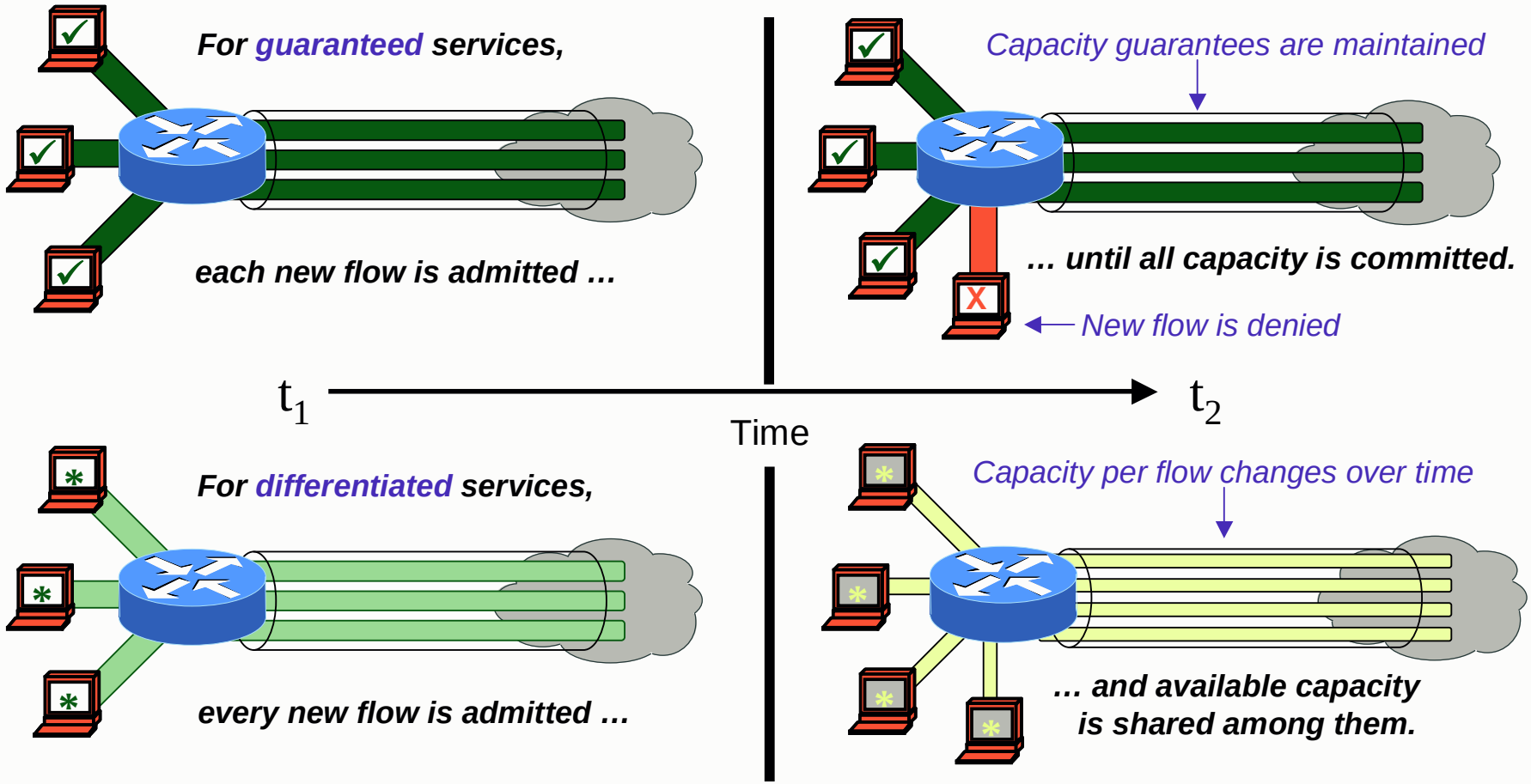


Routing & Traffic Engineering

- **Space Network**
  - IS-IS and iBGP
  - MPLS and DS-TE
- **Access Network**
  - BGP
  - Static
- **External Network**
  - eBGP
  - User-specified



Quality of Service (1)

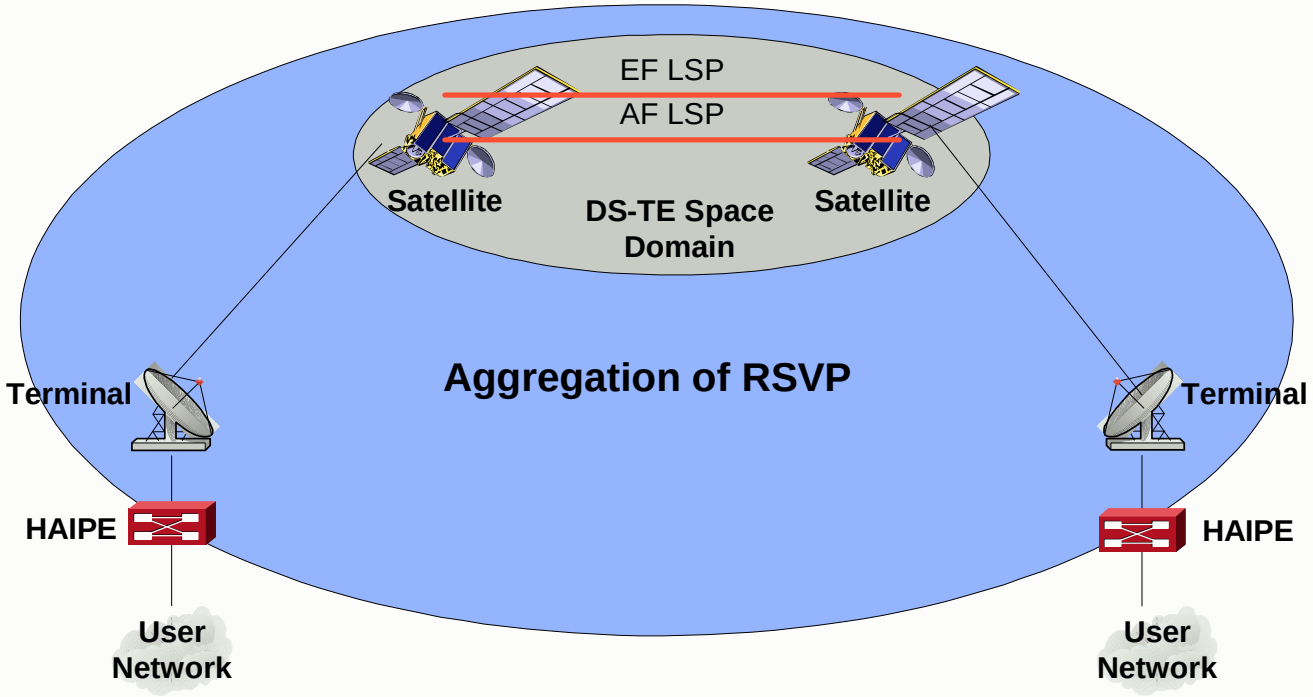


TCA Offers Both Guaranteed and Differentiated Services to Support the Diversity of User Applications

Quality of Service (2)

- Overprovisioning and Oversubscription
- Guaranteed and Differentiated Services

- Treatment based on priority level and other packet markings
- Scalability achieved by managing most flows in aggregate

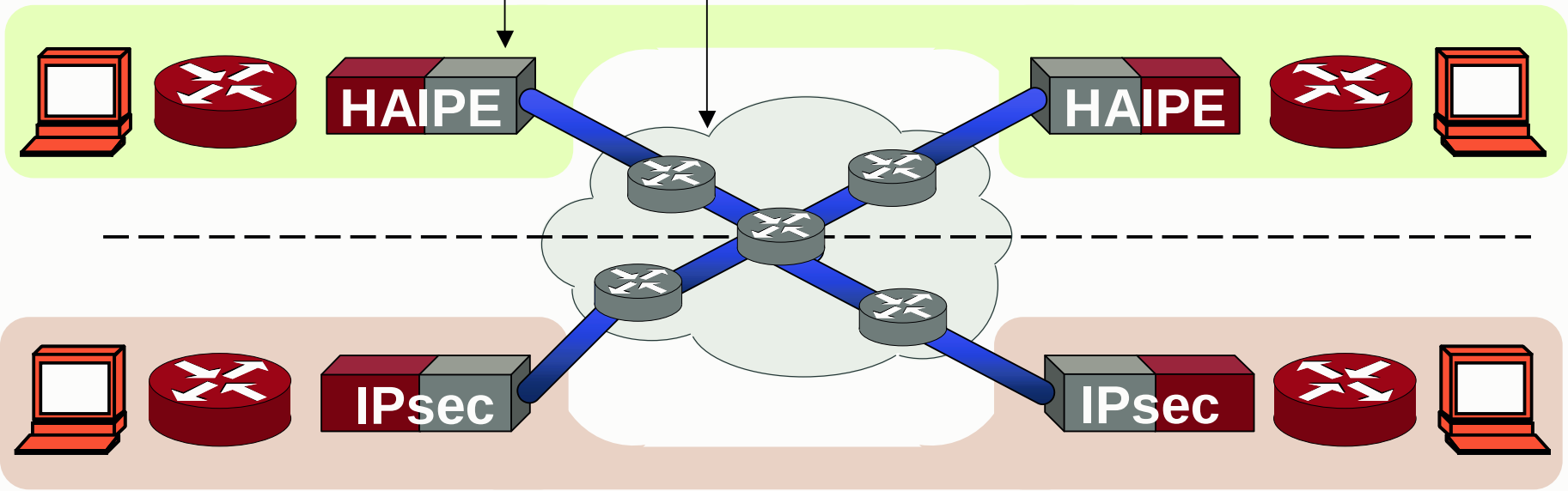


Information Assurance

- **Adopts defense-in-depth approach of Global Information Grid**

- **End-to-end Requirements**
  - Confidentiality
  - Integrity
  - Authentication

- **Transport Network Requirements**
  - Highly available, global data transport service
  - Support dynamic communities of interest (COI)
  - Policy-based network management and control



Summary

- **TCA network provides IPv6 routing and circuit switching**
- **Supports multiple services (data, voice, video, and more)**
- **Interconnection methods establish a network of networks**
- **Common “black” IP transport network; User networks at edge**
- **Quality of Service**
  - Guaranteed and differentiated services
  - Provided from endpoint to endpoint
  - Implemented in aggregate for scalability
- **Information Assurance**
  - Critical services are implemented end-to-end
  - Transport ensures high availability
  - Implementation at network layer enables dynamic COI

Power to the Edge